DP-300809

REMARKS

Claims 1-20 and 22-29 are pending in the present Application. Claims 9, 12, and 29 have been amended, and Claims 30 – 35 have been added, leaving Claims 1 – 20 and 22 – 35 for consideration upon entry of the present Amendment.

The Specification has been amended to correct certain typographical errors, as explained in detail below. The Specification has been amended for clarity. Support for the amendments can be found at least in Figure 9.

Claim 9 has been amended merely to correct a typographical error.

Claim 12 has been amended for clarity and consistency.

Claim 29 has been amended for clarity of language.

Support for new Claims 30, 31, 34, and 35 can at least be found in Paragraph [0016].

Support for new Claim 32 can at least be found in Paragraph [0021].

Support for new Claim 33 can at least be found in Claims 12 and 19 as originally filed.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claim 19 stands rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the limitations "heating said mixture in a chamber comprising said modifying agent; and introducing said modifying agent to said heated mixture" is alleged unclear because it is not clear how the chamber with the modifying agent is heated prior to introduction of the modifying agent to the mixture. This is clear, for example with reference to paragraph [0021]. In this example, the chamber could be a heating chamber or other device such that when the chamber comprising the modifying agent is heated, the modifying agent vaporizes or is otherwise introduced to the mixture (e.g., the modifying agent on

the walls of the chamber or on otherwise in the chamber). Applicants contend that Claim 19 is clear. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1 – 20, 22 – 25, and 28 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 3,607,728 to Wilhelm. Applicants respectfully traverse this rejection.

The present application is directed to a carbon monoxide (CO) selective oxidation catalyst. As discussed in the specification, the CO selectivity is particularly in relation to hydrogen and hydrocarbon oxidation. An exemplary application is the treatment of an effluent stream from a reformer (e.g., that produces hydrogen and carbon monoxide). Claim 1 claims a CO-selective catalyst comprising: a catalytic material, a modifying agent, and a support, wherein the CO-selective catalyst is selective in the removal of carbon monoxide as opposed to hydrogen and hydrocarbon removal. The modifying agent is selected from the group consisting of Pb, Bi, Ge, Si, Sb, As, P, and alloys, nitrates, sulfides, chlorides, and combinations comprising at least one of the foregoing, and is present in an amount of about 2 to about 25 atomic percent, wherein atomic percent is the number of atoms of said modifying agent present in 100 surface atoms of said catalytic material. Claim 12 is a method of making the CO-selective catalyst comprising: combining a catalytic material and a support with about 2 to about 25 atomic percent of a modifying agent to form a modified catalyst-containing support, and disposing said modified catalyst-containing support on or into a substrate.

Opposite the present claims, Wilhelm teaches a process for hydrotreating (hydroprocessing; hydrocracking…) hydrocarbons and mixtures of hydrocarbons that involves the consumption of hydrogen. Their processes are, and are intended to be, "hydrogen consuming". (Col. 1, lines 8 – 30) Wilhelm teaches various lead/noble metal ratios and ranges. However, Wilhelm fails to teach a CO selective catalyst and fails to teach or suggest a catalyst having a modifying agent "present in an amount of about 2 to about 25 atomic percent, wherein atomic percent is the number of atoms of said modifying agent present in 100 surface atoms of said catalytic material" as is taught and claimed in the present application.

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

As stated above, Wilhelm fails to teach the ratio taught in Claim 1. Wilhelm at least also fails to teach: (1) a CO oxidation selective catalyst (in contrast, they teach a hydrogen consuming catalyst); (2) combining a catalyst material and support with about 2 to about 25 atomic percent of a modifying agent as defined in Claim 12; and (3) combining the catalytic material with the support to form a mixture, heating the mixture in a chamber comprising the modifying agent, and introducing the modifying agent to the mixture. Since Wilhelm fails to teach at least one element of the present claims, Wilhelm fails to anticipate the present claims.

It is noted in the Office Action that Wilhelm's "drying and calcining are considered to meet the heating step required by the instant claims..." (Office Action, page 4) However, it is noted that Claim 19 states: combining the catalytic material with the support to form a mixture, heating the mixture in a chamber comprising the modifying agent, and introducing the modifying agent to the heated mixture. In Wilhelm's drying and calcining steps they do not heat the mixture and introduce the modifying agent to the heated mixture. Wilhelm merely generically states that the "lead component can be impregnated prior to, simultaneously with, or after the Group VIII noble metal component is added to the carrier material.... Following the impregnation step, the resulting composite is dried and calcined." (Col. 6, lines 57 – 65) Wilhelm dries and calcines the impregnated carrier material. Heating of the mixture and then introduction of the modifying agent to the heated mixture is neither taught nor suggested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claim 27 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Wilhelm, while Claim 26 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Wilhelm in view of U.S. Patent No. 6,077,489 to Klein et al. Applicants respectfully disagree.

Klein et al. disclose an oxidation catalyst for internal combustion engines. They teach that "[t]he catalytic activity of the oxidation catalyst can be increased greatly by promoting the catalyst with lead at a molar ratio of lead to platinum of 2:1." (Abstract)

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art.... *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Both of Claims 26 and 27 depend from Claim 23 which depends from Claim 12. For at least the reasons set forth above, Claim 12 is novel and non-obvious, and hence dependent Claims 26 and 27 are novel and non-obvious. For example, Wilhelm at least fails to teach or suggest combining a catalyst material and support with about 2 to about 25 atomic percent of a modifying agent. (Paragraph [0030] states "[a]tomic percent is herein defined as the number of atoms of the modifying agent that are present in 100 surface atoms of the catalytic material.") Klein et al. at least fail to cure this deficiency of Wilhelm.

Contrary to the contentions set forth in the Office Action, Wilhelm does not teach the amounts presently claimed, and such amounts are not a "result effective variable". MPEP 2144.05 (II)(B) states:

> A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977)

Applicants claim a CO-selective catalyst, while Wilhelm is directed to catalysts for hydrogen consumption. There is no recognition that parameters of Wilhelm can be modified or "optimized" to produce a CO-selective catalyst. The amounts presently claimed are not mere result effective variables.

Additionally, Wilhelm is concerned with a hydrogenation process using high pressure and high concentrations hydrogen and with a hydrocarbonaceous feedstock (i.e., heavy oil). The other references are to oxidation catalysts. To one experienced in catalysts, it is not obvious that a method of improving a hydrogenation catalyst, particularly one designed to operate at extreme conditions of high hydrogen partial pressure, can be used to modify an oxidation catalyst designed to operate a significantly differing processing conditions. These two classes of reactions operate via widely differing reaction mechanisms and involve different types of active sites. There is no expectation of success that what works on one will work on the other.

DP-300809

Consequently, for at least the reasons that the amounts are not "result effective variables", that both Wilhelm and Klein et al., alone and in combination, fail to teach the amounts of modifying agent presently claimed, and that there is no motivation to combine or expectation of success, a *prima facie* case of obviousness has not been established. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 1, 4 – 18, and 29 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,299,995 to Abdo et al. The Office Action states that:

> The difference between the reference and the claims is that the reference does not disclose that the modifying agent is present in an amount of about 2 to 25 atomic percent as required by claims 1, 12, and 29, or the amount of modifying agent present, as required by claims 9 – 11 and 16 – 18.
>
> ...it is the position of the examiner that the reference recognizes the amount of the modifying agent to be a result effective variable. It would have been obvious to one having ordinary skill in the art at the time the invention was made to choose the instantly claimed ranges through process optimization...

(Pages 8 – 9) Applicants respectfully disagree with the above assessment and disagree that Abdo et al. render the present claims obvious.

It is well established that "catalytic action [ ] cannot be forecast by chemical composition, for such action is not understood and is not known except by actual test." *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 369 (1928).

> The conclusion that [applicants'] invention would have been nonobvious to one having ordinary skill in the art on the basis of the cited art is [ ] buttressed by the fact that the claimed invention is a catalytic process. The unpredictability of catalytic phenomena has been recognized. . .

In re Mercier, 515 F.2d 1161, 185 U.S.P.Q. 774, 779-80 (C.C.P.A. 1975). It is clear from the differences between the teachings of Wilhelm (i.e., hydrogen consuming processes) and the present application (i.e., CO-selective catalyst), that the amounts are not mere result effective variables that are merely optimized. Different catalysts are taught and claimed. The presently claimed amounts are not mere "result effective variables". Since Abdo et al. fail to teach or suggest all of the limitations of the present claims, they, therefore, fail to render the present claims obvious. Reconsideration and withdrawal of this rejection are respectfully requested.

DP-300809

Considering that none of the references of record teach or suggest, alone or in combination, a CO-selective catalyst comprising about 2 to about 25 atomic percent modifying agent, wherein atomic percent is the number of atoms of said modifying agent present in 100 surface atoms of said catalytic material, and considering that the amount of modifying agent is not a result effective variable, all of the claims of the present application are novel and non-obvious over the art of record.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein are allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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